



VoIP for Public Safety

Challenges and Choices in the New Age

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Introduction

One of the most concentrated areas of discussion today in public safety is Voice over IP (VoIP). With the VoIP revolution firmly underway, it is inevitable that every Public Safety Answering Point (PSAP) will need to deal with a growing number of VoIP challenges and choices.

This paper explains VoIP from a public safety perspective, and examines the challenges and choices arising from the VoIP revolution.

Overview of VoIP Technology

VoIP refers to the transmission of voice conversations over a data network.

The "IP" represents the Internet Protocol (as in TCP/IP), a protocol that facilitates data communications over a variety of networks including the internet. VoIP digitizes voice audio, sends it in the form of data packets over an IP network, then converts the data back into audible voice at the receiving end.

There are many applications of VoIP, which for the purposes of this paper, fall into one of the following two broad categories:

- Public and private sector use
- Public Safety Agency use

Public and Private Sector uses of VoIP

Placing phone calls over the public Internet

In this application, an IP device converts voice audio to digital packets and sends them via the public Internet to another IP enabled phone, computer or even a gateway to the public telephone network (which allows the IP phone users to converse with regular landline phone users).

This application affects Public Safety by its lack of a mechanism to ensure that:

- 9-1-1 calls dialed on these IP devices are routed to the appropriate PSAP
- Location information is provided to that PSAP

It is likely that the 9-1-1 call (if processed at all) would be routed based on the location of the gateway that connects the IP and Telephone networks. This gateway could very well be a thousand miles away, and if the call were to reach any PSAP, it would not have an associated ALI delivered.

Routing voice communications over a privately managed network

In this application, VoIP technology carries voice conversations over privately managed network(s). The emphasis on "private" and "managed" is important, due to the reliability requirements of emergency communications - the communication network is "managed" to ensure that data packets containing voice communications are given priority over other data transmissions. Quality of Service (or "QoS") is a measure of the assured reliability of data communications.

This need for guaranteed Quality of Service is one of the reasons the public Internet is unsuited to emergency communications.

Reality - Public and private sector use of VoIP directly affects public safety agencies by creating a new class of callers for emergency response that do not receive the same level of service that traditional callers receive. Though the control of public and private sector use of VoIP is outside the direct influence of public safety agencies, many are working with government agencies to set standards for the delivery of the same level of service provided to traditional callers for VoIP callers.

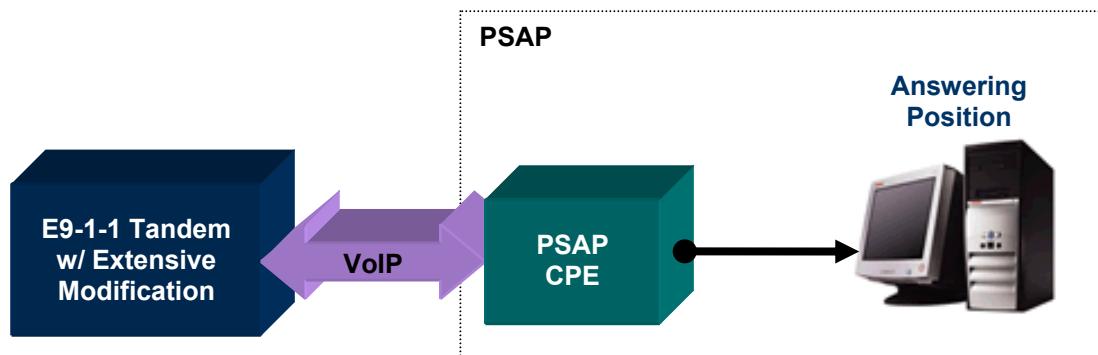
VoIP as a replacement for E9-1-1 Trunks

Idealistic View – VoIP could replace E9-1-1 CAMA Trunks, providing delivery of voice as well as ALI (and possibly other supplemental information). This would reduce the number of links coming into the PSAP, eliminate a process that waits for a call to reach a PSAP before ALI request, reduce the call delivery time and possibly provide supplemental information to the PSAP.

Reality – Public Safety Telecom has a significant investment in its present infrastructure, which has a proven record of accomplishment of features and capabilities. While the promise of VoIP is attractive, its implementation would require widespread and instant change to an infrastructure that supports VoIP.

The change to VoIP represents a significant investment by the telephone companies and PSAPs. The issue of whether this investment is justified in terms of the value returned and the lack of a cost recovery mechanism is unclear.

Additionally, the change to VoIP must not diminish, and should add to, the capabilities and service level offered by the existing infrastructure. At present, there are several significant technical challenges whose solution is unclear, such as call supervision and retention of calling party number between transfers.



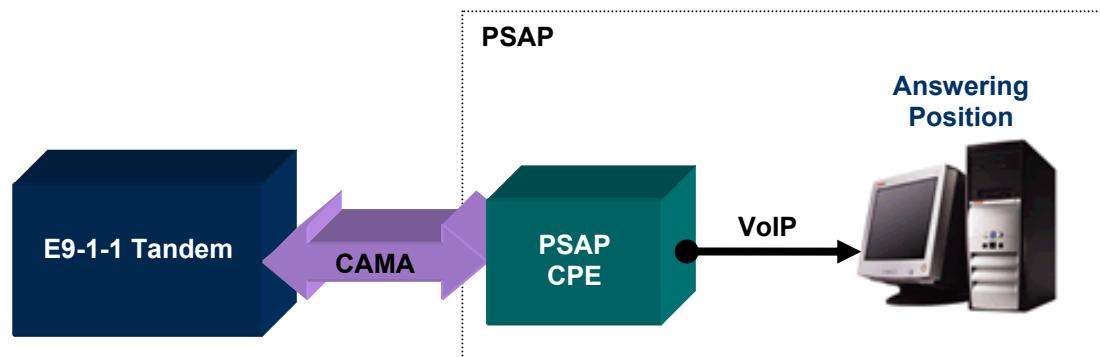
VoIP in the Public Safety Answering Point

Idealistic View – VoIP would replace the link between a PSAP's Backroom CPE and the local answering positions allowing VoIP for voice and data delivery. This would provide increased functionality; equipment cost savings, as well as a native approach to directly answering VoIP originated calls.

Reality – This application of VoIP is in its infancy. Several vendors market products that on close examination offer a reduced feature set, diminished reliability and no clear product evolution for the future. So far, the focus seems to be on saying that they offer VoIP when what is important is an explanation of how their VoIP product enhances your service to the community.

You need to ask yourself the following questions when considering if VoIP is the correct choice for your public safety solution.

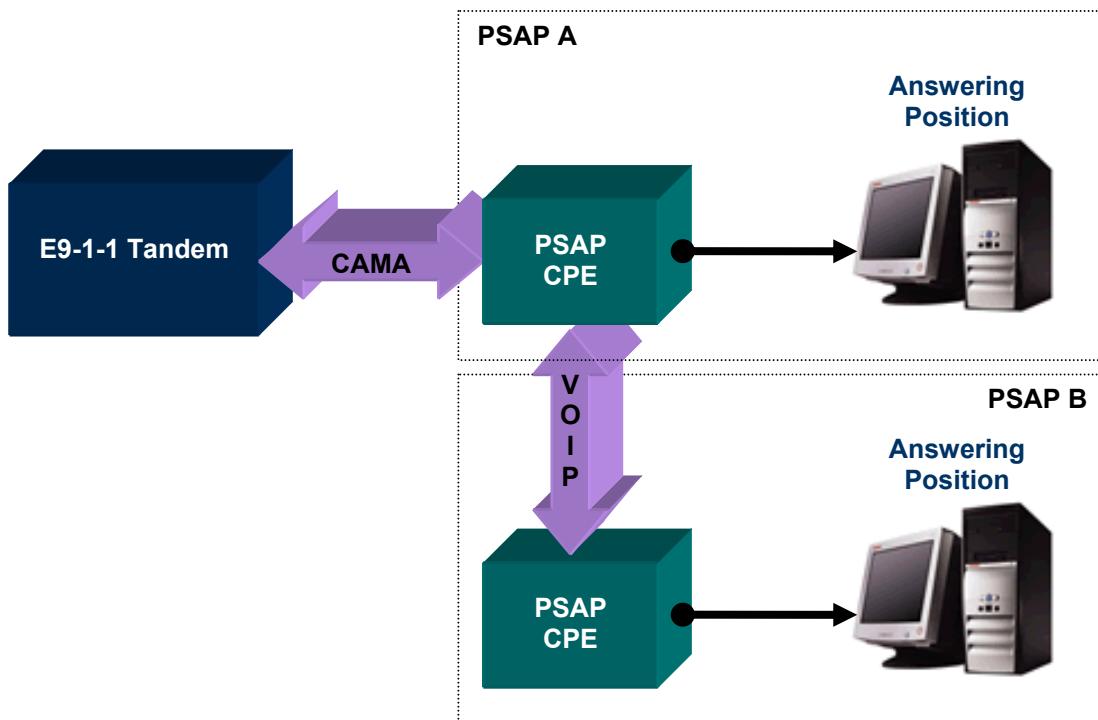
- Am I losing any functionality that I currently have today?
- What functionality am I gaining?
- Does the solution provide redundancy at all levels?
- Is the network shared with other applications that are not mission critical?
- Is the solution safe against computer viruses and hackers?
- What is the long-term evolution of my provider?



VoIP as a link between PSAPs

Idealistic View – VoIP could be used as a link between PSAPs, and provide near-instantaneous transmission of both Voice and Data over a single data connection. This would be more cost efficient and provide better performance for PSAPs that are functioning as one consolidated PSAP.

Reality – This application of VoIP is viable today. The consolidation of voice and data provides costs savings between the PSAPs in reusing centrally located E9-1-1 specialized equipment. It increases the richness of information that can be exchanged between the PSAP that answered the call and the PSAP that received the transfer. Examples include location information, incident information, questions and answers gathered so far.



Conclusion

The challenges and choices facing public safety agencies today are many in number and complex in their impact.

For the Public Safety environment, the logical path forward is the implementation of Voice over IP initially for those functions that provide an immediate advantage within the current infrastructure. Gradual evolution of the infrastructure will over time allow phase-in of additional applications of VoIP connectivity where warranted by the value provided.

To learn more about VoIP and the VoIP solutions provided by Positron Public Safety Systems, please contact the Regional Sales Manager for your state.